

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-046088

(43)Date of publication of application : 12.02.2002

(51)Int.Cl.

B25J 13/08

B25J 5/00

B25J 19/00

H04N 7/15

(21)Application number : 2000-235423

(71)Applicant : MATSUSHITA ELECTRIC IND CO  
LTD

(22)Date of filing : 03.08.2000

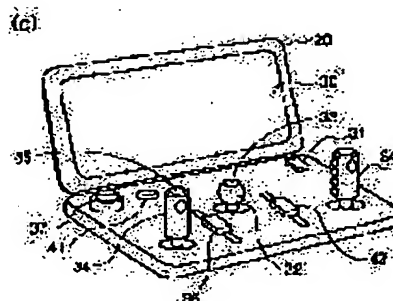
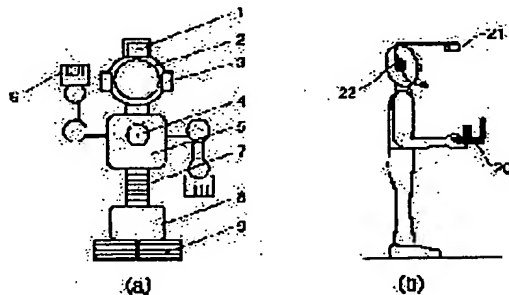
(72)Inventor : OHASHI KAZUYA  
ROKUDO ITSUO  
MATSUSHIMA KUNIO

## (54) ROBOT DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To permit a meeting with a realistic feel such that an operator views the condition of the meeting, listens, shows expressions, speaks, presents data, shakes hands, etc., via a robot brought to a remote meeting room.

SOLUTION: This robot device comprises a robot body with a camera 1, a stereo microphone 3, a display 2 for displaying expressions, a speaker 4, a CPU body, a communications unit 5, a telescopic mechanism 7 and a travel device 9; and an operating terminal with a display 30, a head operating portion, a line-of-sight operating portion 32, an arm drive and operating portion, a travel operating portion 34, a telescopic movement operating portion 36, a voice adjusting portion 37, a communications unit 38, and a stereo headphone and microphone 22 having an image pickup portion 21.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

[Claim 1] It is robot equipment which consisted of a robot body and an operating station for operating this robot body by remote control. Said robot body The camera which photos a vision environment continuously, and the microphone which catches acoustic environment as a sound signal, The robot display which displays an operator's expression, and the loudspeaker which outputs the voice about which an operator speaks, The CPU body which performs data processing of the whole robot body, and control, and the robot communication link unit which transmit and receive information between said operating stations, The operating station display which displays the image to which it has the skill section which is the skill which can exercise, and the transit section for migration, and said operating station was sent from said camera, The head control unit which operates movement of the head of said robot body, and the look control unit which operates migration of bearing which said camera photos, The skill drive control unit which operates movement of said skill section, and the transit control unit which operates movement of said transit section, The sound-volume controller which carries out adjustment actuation of the sound volume of the voice outputted from said loudspeaker, The operating station communication link unit for transmitting and receiving information between said robot bodies, Robot equipment characterized by having a headphone microphone for talking that it is attached to said operating station, have the image pick-up section for photoing an operator's expression, and the sound signal from said microphone is heard, and it outputs to said loudspeaker.

[Claim 2] The head control unit of said operating station is robot equipment according to claim 1 characterized by making a switch of a function at a look control unit by actuation of a head / look change-over switch.

[Claim 3] The skill drive control unit of said operating station is robot equipment according to claim 1 characterized by making a switch of a function at a transit control unit by actuation of skill / transit change-over switch.

[Claim 4] Robot equipment according to claim 1 characterized by having been attached to said operating station, having replaced with the headphone microphone equipped with the image pick-up section, and building the image pick-up section, a loudspeaker, and a microphone in said operating station.

[Claim 5] Robot equipment according to claim 1 characterized by having formed the laser pointer in the skill section of said robot body, and preparing the switch which carries out flashing of said laser pointer, and accommodation of the projection direction to said operating station, and a controller.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the robot equipment which serves as an operator's other self and acts and which is especially used for teleconferencing etc.

[0002]

[Description of the Prior Art] Conventional robot equipment had the industrial robot which does the activity of welding, paint, or an assembly instead of human being and which has action controlled by the program, and various kinds of sensors and an autonomous type robot with CPU. Moreover, in the conventional video conference system, it was what performs an arrangement in a remote place by transmitting two or more voice and images of a remote conference hall to a mutual conference hall.

[0003]

[Problem(s) to be Solved by the Invention] However, conventional robot equipment was what [ only ] carries out fixed actuation to the condition of having repeated the actuation for which the operator itself does not grasp the situation of robot equipment and it generally opted, or having been decided, operating it.

[0004] Furthermore, although the signal transduction between two or more remote conference halls is based on voice and an image and the arrangement in a remote place was once completed in the conventional video conference system, for the participant, it was what I hear that the voice and the image which were edited with automatic or hand control must be received, heard and seen, and it is passive, and there is no sense of togetherness among participants compared with a meeting in the same room, and lacks in presence.

[0005] This invention is made in view of such a point, the robot equipment of this invention transmits the perimeter situation of a robot body to an operator, and it aims at offering the outstanding robot equipment which can serve as an operator's own other self.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned problem the robot equipment of this invention It is robot equipment which consisted of a robot body and an operating station for operating this robot body by remote control. Said robot body The camera which photos a vision environment continuously, and the microphone which catches acoustic environment as a sound signal, The robot display which displays an operator's expression, and the loudspeaker which outputs the voice about which an operator speaks, The CPU body which performs data processing of said whole robot body, and control, The robot communication link unit which transmits and receives information between said operating stations, and the skill section which is the skill which can be exercised, The operating station display which displays the image to which it has the transit section for migration and said operating station was sent from said camera, The head control unit which operates movement of the head of said robot body, and the look control unit which operates migration of bearing which said camera photos, The skill drive control unit which operates movement of said skill section, and the transit control unit which operates movement of said transit section, The sound-volume controller which carries

out adjustment actuation of the sound volume of the voice outputted from said loudspeaker, The operating station communication link unit for transmitting and receiving information between said robot bodies, It is attached to said operating station, and has the image pick-up section for photoing an operator's expression. The robot equipment characterized by having a headphone microphone for talking that the sound signal from said microphone is heard, and it outputs to said loudspeaker can be offered, and confrontation negotiation can be carried out as an operator's substitute.

[0007] Furthermore, the head control unit of said operating station is made to be made by switch of a function at a look control unit by actuation of a head / look change-over switch, and the robot equipment of this invention can make a control unit serve a double purpose.

[0008] Moreover, the skill drive control unit of said operating station is made to be made by switch of a function at a transit control unit in actuation of skill / transit change-over switch, and the robot equipment of this invention can make a control unit serve a double purpose.

[0009] Moreover, the robot equipment of this invention can be attached to said operating station, can be replaced with said headphone microphone equipped with the image pick-up section, and can contain the image pick-up section, a loudspeaker, and a microphone in said operating station, and an image and voice can be sent and received by the operating station.

[0010] Moreover, the robot equipment of this invention enables flashing of said laser pointer, and accommodation of the projection direction by forming a laser pointer in the skill section of said robot body, and preparing the switch and controller which carry out flashing of said laser pointer, and accommodation of the projection direction to said operating station.

[0011]

[Embodiment of the Invention] Drawing 1 is drawing showing the whole robot equipment system, among those drawing 1 (a) is drawing showing the appearance of a robot body. The head of a robot body is equipped with the camera 1, the display 2, and the stereo microphone 3 in drawing 1 (a). Idiosoma is equipped with a loudspeaker 4, the communication link unit 5 for transmitting and receiving to a CPU body and operator side, and two skill. There is a laser pointer 6 for directing drawing etc. in one skill. Between idiosoma and a foot, it connects according to the flexible device 7, and the foot is equipped with the power unit 8 and the traveller 9.

[0012] Drawing 1 (b) is drawing showing actuation of an operator. In drawing 1 (b), an operator operates a robot body using an operating station 20, and equips a head with the image pick-up section 21 and the stereo headphone microphone 22.

[0013] The operating station 20 is equipped with the display 30 for displaying the image picturized with the camera of a robot body, as shown in drawing 1 (c), and power-source ON \*\*\*\* 31 which performs power-source the enter end of the whole system, and there is a head control unit 32 which operates the head of a robot body further. The head control unit 32 can be used as a look control unit by switch of a head / look change-over switch 33. If it becomes a look control unit and leans in front by specifically pushing a head / look change-over switch 33, a camera 1 will turn to the bottom, and a top will be turned to if it leans back. Moreover, if it becomes a head control unit and leans in front by lifting a finger from a head / look change-over switch 33, a head will turn to the bottom, if it leans back, a top will be turned to, and a head can be converted now to right and left by leaning to right and left. The inclination of the rod operates a motion of the arm of skill, and, as for the skill drive control unit 34, the carbon button of the grip section side face operates a motion of a finger. By specifically pushing the carbon button of a grip section side face, a finger will be in the condition of having bent and a finger will be in the condition of having lengthened, by detaching. Furthermore, an arm can be moved all around by leaning the rod of the skill drive control unit 34. Moreover, by pushing skill / transit change-over switch 35, it becomes a transit control unit and a motion of a traveller 9 can be operated. A robot body is moved forward and backward, and it is made to convert to right and left by leaning a rod. If the flexible control unit 36 operates telescopic motion of the flexible device 7 and lengthens a tongue to the front, it will be shrunk, and if it pushes back, it can be lengthened. The sound volume of the stereo headphone 22 can be taken up and down by the voice controller's 37 consisting of two annular tongues arranged at the same axle, and being able to take up and down the sound volume of the loudspeaker 4 of a robot body by

turning a lower tongue, and turning an upper tongue. The zoom control unit 42 operates the field of view of a camera 1, by lengthening a tongue to the front, can make a field of view large and can narrow it by pushing back. Moreover, by pushing the laser pointer switch 41, the laser pointer 6 of a robot body is made to turn on, and the carbon button of the grip section side face of the right-hand side manual drive control unit 34 changes to coincidence at a thing with the actuation function to move the projection direction of the laser pointer 6. By pushing the laser pointer switch 41 again, the laser pointer 6 is switched off and the function of the carbon button of the grip section side face of the right-hand side skill drive control unit 34 is restored to coincidence.

[0014] Next, actuation of each block is explained using drawing 2. Drawing 2 is the block diagram of a robot body, and the same number same name explained to drawing 1 explains the same actuation. As the other thing, there is a camera mechanical component 10 in a head, and the direction of the visual field of a camera 1 is moved according to actuation of the look control unit 32 shown by drawing 1 (c). The head drive control section 11 controls the head mechanical component 12 according to a motion of the head control unit 32 of drawing 1 (c). Furthermore, the head drive control section 11 also performs control of the camera 1 with which a head is equipped, a display 2, the stereo microphone 3, and the camera mechanical component 10 together. Moreover, in the part in idiosoma, CPU body 5a is equipped with the information processing section, a store, the encryption processing section, and the image processing section, and performs data processing of this whole robot equipment, and control.

Communication link unit 5b is a unit which performs the communication link with an operating station 20. Moreover, the skill drive control section 13 performs a fuselage station and control by the whole skill part, and is equipped with the laser pointer 6 in the skill mechanical component 14, and can make the laser pointer 6 turn on and switch off by actuation of the laser pointer switch 41 of an operating station. The foot is equipped with the power unit 8 and the flexible control section 15. The flexible mechanical component 16 can be operated by motion of the flexible control section 15. Moreover, the transit mechanical component 18 can be moved by the command of the transit control section 17 of a foot.

[0015] Next, the drive approach of robot actuation is explained based on drawing 3. Drawing 3 is the block diagram of an operating station. Since the thing of the same number same name with which this was also shown in drawing 1 (c) is a thing of the same actuation, it omits explanation. what performs the communication link with communication link unit 5b which explained previously the communication link unit 38 shown in drawing 3 -- it is -- in addition -- and the communication link with the image pick-up section 21 and the stereo headphone microphone 22 with which an operator's head was equipped is performed. The storage section 39 can memorize once the information which once memorizes the information sent from robot equipment, and is displayed on the display 30 of an operating station. The control processing section 40 controls a communication link unit etc. while controlling the operating station 20 whole. Moreover, the communication link unit 23 can transmit and receive the information on the stereo headphone microphone 22 with which the head was equipped, and the image pick-up section 21.

[0016] Then, the flow of the outline about this robot equipment is explained based on a flow chart. In drawing 4, the flow of remote place communication is shown first. The remote place in which an operator is present, and the conference hall where the meeting is held can be transmitted and received by the communication link units 5b and 38 explained previously. The image of a remote place and the information on audio are first received by the operating station 20, and the condition is displayed on a display 30 (S1). It is judged whether a look change is made according to the condition of the display (S2), and look migration is performed by transit and a height drive, a head drive, camera look adjustment, etc. when a look change should be made (S3). Next, it is judged whether voice adjustment is carried out according to the receive state of the stereo headphone 22, and (S4) and when adjusting, according to actuation of the voice controller 37 of an operating station 20, loudspeaker volume control and reception volume control are performed (S5). Furthermore, it is judged whether skill actuation is carried out (S6), and it is performed by actuation of the skill drive control unit 34 of an operating station when operating it (S7). Voice can be caught by the robot body by the above actuation (S8), it can talk

further, and (S9) and this condition can be transmitted to the operator of a remote place (S10). It is specifically transmitted to the direction of a display 30 and the stereo headphone 22, and a condition gets across to an operator.

[0017] Then, a concrete meeting is shown and it explains. A partner is spoken to, when an image and voice are received as shown in drawing 5 R> 5 (S21). In this case, if an operator speaks to the microphone of the stereo headphone microphone 22, he will be in the condition of addressing to the partner of a meeting with that voice being outputted from the loudspeaker 4 of a robot body (S23). When carrying out by judging whether a look change is made (S24) on the display 30 of an operating station 20, camera angle-of-visibility adjustment can be carried out by actuation which is the zoom carbon button 42 further in which what adjustment of each control unit of an operating station performs transit and height drive, head drive, camera look adjustment, etc. for can adjust a look (S25). Moreover, when shaking hands during a meeting or carrying out actuation of a hand, a hand can be grasped by actuation (S28) of (S27) and the skill drive control unit 34 of an operating station, or a hand can be raised (S26). When sending data to the display under meeting, and the projector of a remote place according to the condition of a meeting, it is what is made to transmit data to the projector in the personal computer and conference hall which are not attached to this equipment (S30), and a robot body and an operator can advance a meeting, looking at the condition. Furthermore, a robot body can point to the contents of the screen of the projector in a conference hall using the laser pointer 6. By specifically pushing the laser pointer switch 41 of an operating station 20, the laser pointer 6 with which the skill section of robot equipment is equipped can be made to be able to turn on, and the light can be applied to the screen side of a projector (S31). Moreover, the voice from the stereo headphone microphone 22 can be transmitted to the loudspeaker 4 of a robot body as voice (S32), further, with the stereo microphone 3 of a robot body, the voice from a meeting participant can be caught and voice can be transmitted to the headphone of an operator's stereo headphone microphone 22 (S33). Actuation of the situation of a meeting by the above and voice, and also data presentation is possible by actuation of this robot equipment.

[0018]

[Effect of the Invention] By the above, even if an operator is not in the conference hall in a remote place, a meeting can be heard with the same condition as an attendant, or it can see, or can talk, and the condition of the meeting can be further recorded on the storage section of a body.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

TECHNICAL FIELD

---

[Field of the Invention] This invention relates to the robot equipment which serves as an operator's other self and acts and which is especially used for teleconferencing etc.

---

[Translation done.]



**\* NOTICES \***

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**PRIOR ART**

---

[Description of the Prior Art] Conventional robot equipment had the industrial robot which does the activity of welding, paint, or an assembly instead of human being and which has action controlled by the program, and various kinds of sensors and an autonomous type robot with CPU. Moreover, in the conventional video conference system, it was what performs an arrangement in a remote place by transmitting two or more voice and images of a remote conference hall to a mutual conference hall.

---

[Translation done.]

**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**EFFECT OF THE INVENTION**

---

[Effect of the Invention] By the above, even if an operator is not in the conference hall in a remote place, a meeting can be heard with the same condition as an attendant, or it can see, or can talk, and the condition of the meeting can be further recorded on the storage section of a body.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

TECHNICAL PROBLEM

---

[Problem(s) to be Solved by the Invention] However, conventional robot equipment was what [ only ] carries out fixed actuation to the condition of having repeated the actuation for which the operator itself does not grasp the situation of robot equipment and it generally opted, or having been decided, operating it.

[0004] Furthermore, although the signal transduction between two or more remote conference halls is based on voice and an image and the arrangement in a remote place was once completed in the conventional video conference system, for the participant, it was what I hear that the voice and the image which were edited with automatic or hand control must be received, heard and seen, and it is passive, and there is no sense of togetherness among participants compared with a meeting in the same room, and lacks in presence.

[0005] This invention is made in view of such a point, the robot equipment of this invention transmits the perimeter situation of a robot body to an operator, and it aims at offering the outstanding robot equipment which can serve as an operator's own other self.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1] The whole robot equipment system chart

- (a) The external view of a robot body
- (b) Drawing showing actuation of an operator
- (c) Drawing showing the operating station of robot equipment

[Drawing 2] The block diagram of a robot body

[Drawing 3] The block diagram of the operating station of robot equipment

[Drawing 4] The control flow chart which shows the flow of remote place communication

[Drawing 5] The control flow chart which shows the example of a meeting

[Description of Notations]

- 1 Camera
- 2 Display
- 3 Stereo Microphone Section
- 4 Loudspeaker
- 5 CPU Body and Communication Link Unit
- 5a CPU body
- 5b Communication link unit
- 6 Laser Pointer
- 7 Flexible Device
- 8 Power Unit
- 9 Traveller
- 10 Camera Mechanical Component
- 11 Head Drive Control Section
- 12 Head Mechanical Component
- 13 Skill Drive Control Section
- 14 Skill Mechanical Component
- 15 Flexible Control Section
- 16 Flexible Mechanical Component
- 17 Transit Control Section
- 18 Transit Mechanical Component
- 20 Operating Station
- 21 Image Pick-up Section
- 22 Stereo Headphone Microphone
- 23 Communication Link Unit
- 30 Display
- 31 Power-Source ON \*\*\*\*
- 32 Head Control Unit (Look Control Unit)
- 33 Head / Look Change-over Switch

34 Skill Drive Control Unit (Transit Control Unit)  
35 Skill / Transit Change-over Switch  
36 Flexible Control Unit  
37 Voice Controller  
38 Communication Link Unit  
39 Storage Section  
40 Control Processing Section  
41 Laser Pointer Switch  
42 Zoom Control Unit

---

[Translation done.]

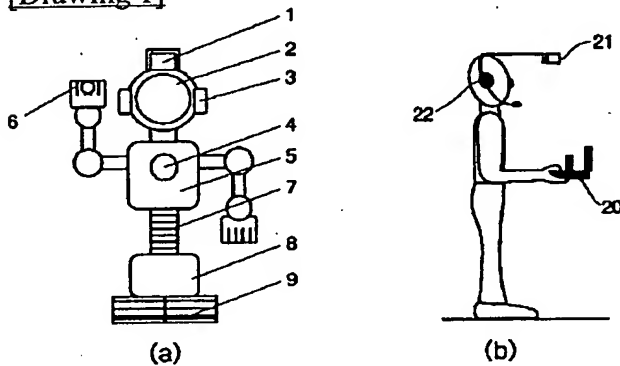
## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

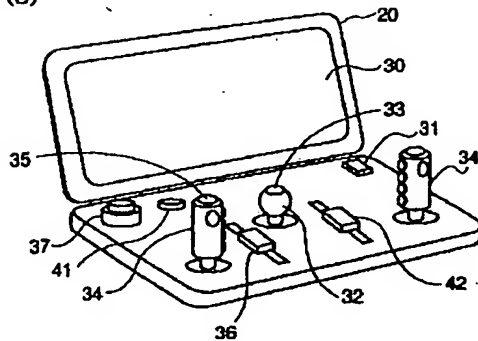
## DRAWINGS

[Drawing 1]



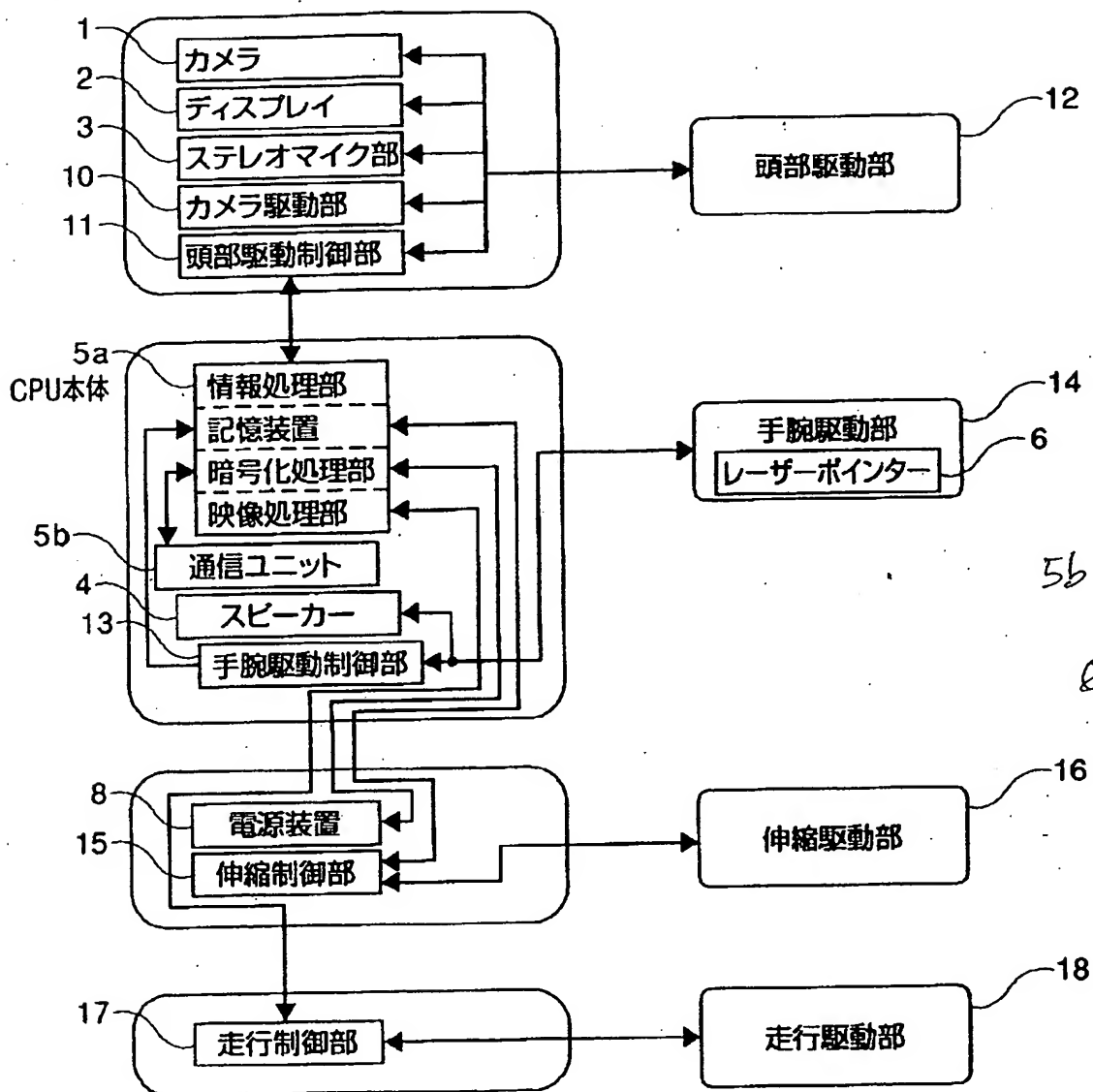
- 1: Camera  
 2: Display  
 3: Stereo microphone  
 4: loudspeaker  
 5: Communication link unit  
 6: laser pointer  
 7: strobe lamp  
 8: power unit  
 9: traveler  
 20: head control unit  
 21: image pickup device  
 22: stereo headphones  
 30: display  
 31: power switch  
 32: head control unit  
 34: Skull Drive Control unit  
 35: Transist changeover switch  
 42: zoom control unit

(c)



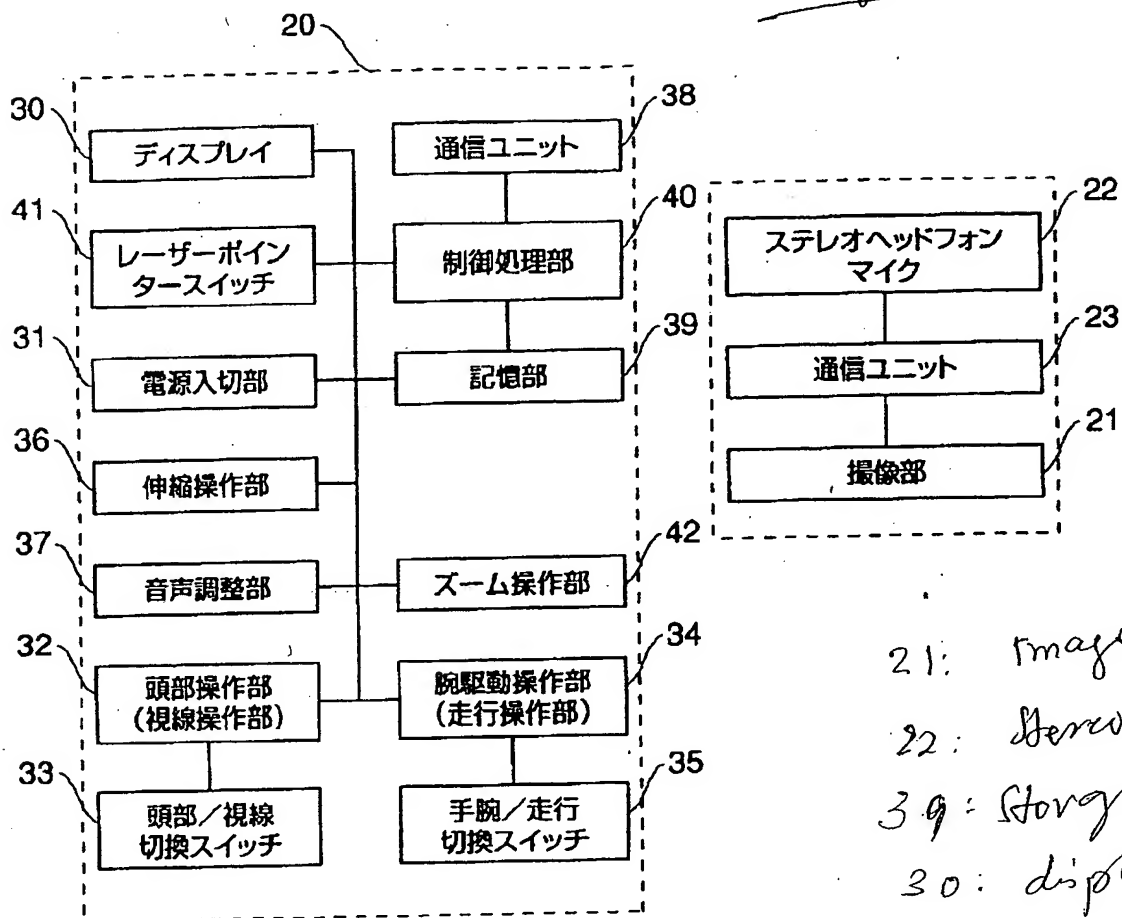
[Drawing 2]

Drawing: 2



[Drawing 3]

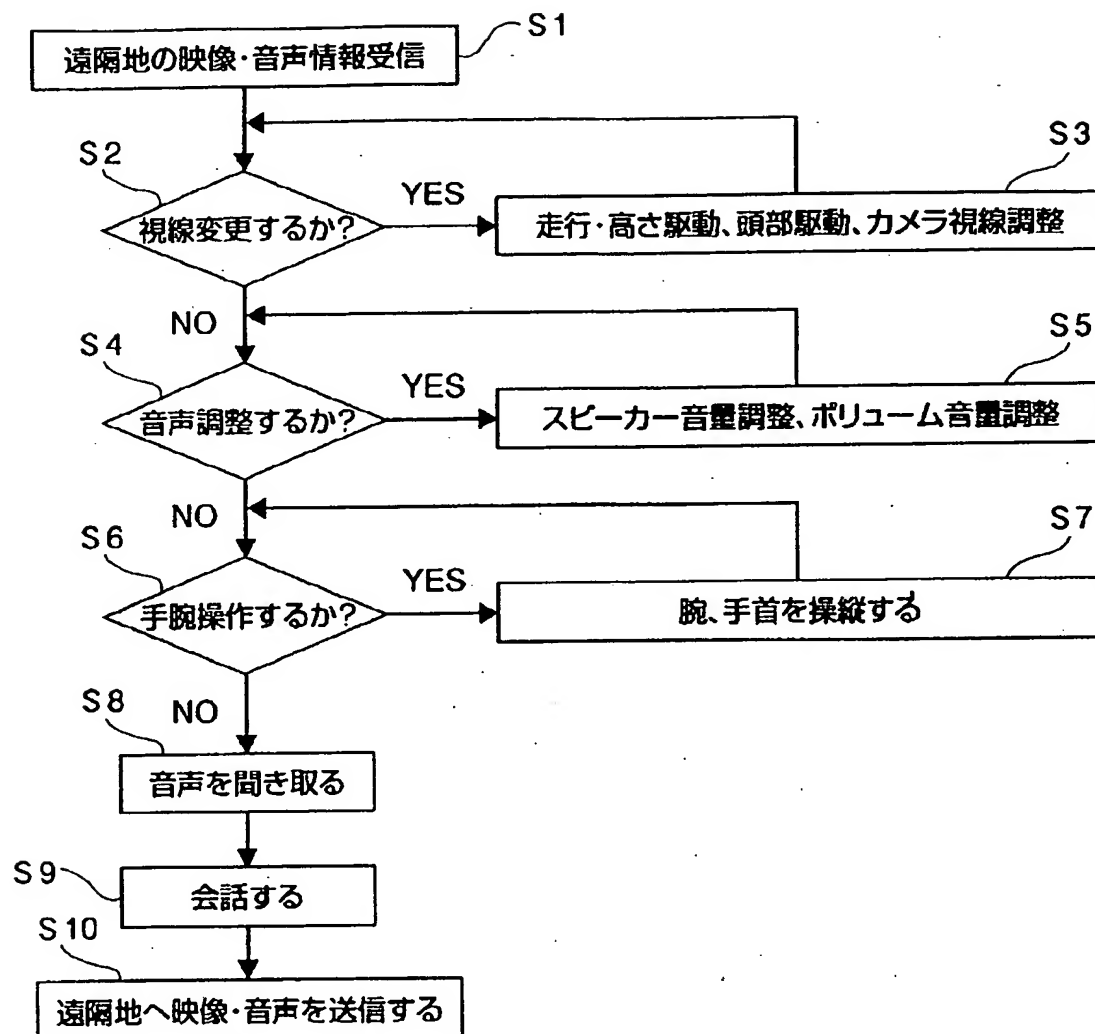
Drawing 3



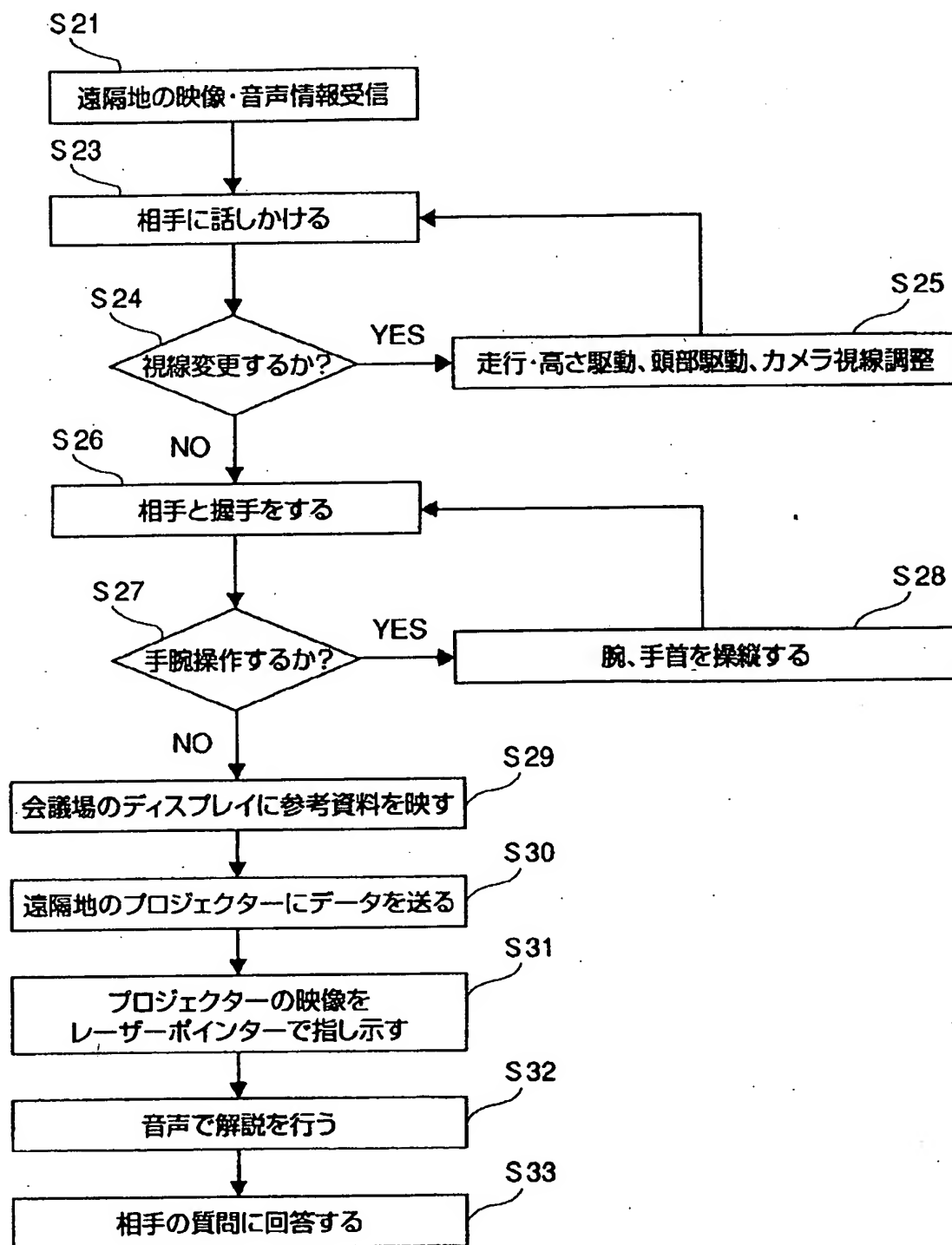
[Drawing 4]

21: Image pick up unit  
 22: Stereo headset microphone  
 39: Storage  
 30: display  
 23: Communication unit





[Drawing 5]



[Translation done.]